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ABSTRACT

This paper focuses on the demand for and supply of intermediate-level vocational skills within the United Kingdom (UK) economy. Using existing research from surveys and case studies, Part One argues that there is a lack of evidence that widespread intermediate-skill shortages exist within the expanding service sector. In the manufacturing sector, however, skill shortages persist, although there have been large-scale reductions in the number of intermediate-level workers (craft workers). Overall, there appears to be a weakness in the demand for intermediate-level skills across the UK economy, reflecting the large numbers of firms that are pursuing relatively low-skilled, low-quality product market strategies. Part Two examines the stock of intermediate-level skills in the population and by selected industry sectors for the UK and for other European countries. This part notes that while the UK has produced more young individuals with intermediate qualifications, these qualifications are overwhelmingly academic and most of these students proceed to higher education, rather than acquiring vocational qualifications. Evidence from other countries shows that both the fulltime and work-based part-time routes can produce a mix of academic and vocational qualifications. The paper concludes that there is both a weak demand for intermediate-level skills from employers and a weak supply of employees with these skills. It also maintains that policy developments in this area must recognize and deal with these two elements if the UK is going to be able to compete in those markets that require a high proportion of employees to use middle- to high-level vocational skills. (Contains 58 references.) (KC)

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Skills Task Force
Research Paper 4

Intermediate Level Skills - How are they changing?

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Skills Task Force Research Group

Foreword

The Secretary of State for Education and Employment established the Skills Task Force to assist him in developing a National Skills Agenda. The Task Force has been asked to provide advice on the nature, extent and pattern of skill needs and shortages (together with associated recruitment difficulties), how these are likely to change in the future and what can be done to ease such problems. The Task Force is due to present its final report in Spring 2000.

The Task Force has taken several initiatives to provide evidence which can inform its deliberations on these issues. This has included commissioning a substantial programme of new research, holding consultation events, inviting presentations to the Task Force and setting up an academic group comprising leading academics and researchers in the field of labour market studies. Members of this group were commissioned to produce papers which review and evaluate the existing literature in a number of skills-related areas. The papers were peer-reviewed by the whole group before being considered by members of the Task Force, and others, at appropriate events.

This paper is one of the series which have been commissioned. The Task Force welcomes the paper as a useful contribution to the evidence which it has been possible to consider and is pleased to publish it as part of its overall commitment to making evidence widely available.

However, it should be noted that the views expressed and any recommendations made within the paper are those of the individual authors only. Publication does not necessarily mean that either the Skills Task Force or DfEE endorse the views expressed.

Summary

1. This paper focuses on the demand and supply for intermediate level vocational skills within the UK economy. Part One provides a discussion of employer requirements for intermediate level skills and the extent to which these skills are changing. Using existing research from surveys and case studies, there is an exploration of whether skill shortages exist and the implications of changes in the organisation of work for the levels and types of intermediate skills required. Part Two examines stocks of intermediate level skills in the population and by selected industry sectors for the UK and for other European countries. There then follows an analysis and decomposition of the most recent period of growth in qualifications of young people since 1988 and an overview of modes of production of intermediate vocational qualifications in Britain and some other European countries. Research based on investigation of matched samples of plants in Britain compared to other European countries and the US is quoted to illustrate the way in which intermediate vocational qualifications can contribute to raising productivity levels in manufacturing and in services.

2. Part One argues that there is a lack of evidence to support the view that there are widespread intermediate skill shortages within the expanding service sector. Contrary to survey evidence, which supports the view of generalised upskilling, case study research is more cautionary, highlighting the polarisation of skills in some areas. In the manufacturing sector, although there have been large-scale reductions in the number of intermediate level workers, i.e. craft workers, skill shortages persist. Skill levels of the remaining craft workers have generally been maintained and often transformed with the use of computer technology, although in some areas this has been associated with deskilling. Overall there appears to be a weakness in the demand for intermediate level skills across the UK economy, reflecting the large numbers of firms that are pursuing relatively low skilled, low quality product market strategies.

3. Changes to intermediate level jobs are complex and vary across firms, sectors and countries. Technological change does not determine the occupational skills required, instead the way that technology is applied and combined with different skills of employees depends on a variety of factors,

such as managerial strategy, existing skills, workplace practices and product markets. The evidence from the UK is that a number of firms are using technology to supply simpler products with a less skilled workforce. Increasing the supply of skills is only one element among many that may allow firms to successfully compete in high value-added markets.

4. The survey of growth in stocks of intermediate qualifications in the UK and in other European countries confirms that these countries continue to enjoy a substantial advantage in stocks of intermediate qualifications relative to the UK. Part two provides an analysis of the results of a recent international survey of adult literacy (IALS), which shows that the UK/US intermediate deficit is reproduced in the IALS survey, indicating that the deficit mapped by reference to qualifications reflects in broad terms a 'real skills' deficit.

5. While the UK has produced more young individuals with intermediate qualifications since the late 1980s than in any previous period, these qualifications are overwhelmingly academic (A-level). Most proceed to higher education. Vocational qualifications (NVQ3) have grown only qualifications are overwhelmingly academic (A-level). Most proceed to higher education. Vocational qualifications (NVQ3) have grown only slightly. Data from the Further Education Funding Council confirm that for young people the route to intermediate vocational qualifications (NVQ3) within full-time education barely exists.

6. Evidence from other countries shows that both the full-time and work-based part-time routes 16-19 can provide for around 80 per cent of the cohort and produce a mix of academic and vocational qualifications with around half of all those participating on each route. A number of factors, including the nature of NVQ assessment and the very great susceptibility to 'academic drift' which affects British educational institutions help to explain the lack of a coherent vocational route with progression possibilities for young people in the UK. However, the existence of a small but expanding apprenticeship programme in Britain indicates that the occupationally-focused courses could, in future make a significant contribution to the production of intermediate vocational skills.

7. NIESR studies of production and productivity in a high skill environment show that this environment allows the production of a greater variety and higher quality of goods and services at competitive prices than is the case in the UK. An analysis of stocks of skills in five sectors of the economy shows that many jobs which are performed by graduates in the UK appear to be filled by employees with intermediate Level 3 skills in other European countries, particularly Germany and the Netherlands. A switching of government resources from higher education to support routes which produce Level 3 vocational skills would therefore benefit individuals (higher wages, less social exclusion) and companies in the form of greater workforce flexibility and adaptability.

8. The paper indicates that there is both a weak demand for intermediate level skills from employers and a weak supply of employees with these skills. Policy developments in this area must recognise and deal with these two elements, if the UK is going to be able to compete in those markets which require a high proportion of employees to use middle to high level vocational.

Part 1

The Demand and Supply of Intermediate Level Vocational Skills: A Review of Recent Trends

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Introduction

9. This part of the paper provides a discussion of employer requirements for intermediate level skills within the UK economy and the extent to which these skills are changing. There is an assessment of existing evidence from surveys and case studies of intermediate skills in different occupations and industries and whether any significant developments are taking place. This evidence is linked into the broader debate about whether there are shortages of intermediate level skills.

10. Ryan defines intermediate skills as 'those above routine skills but below professional ones' (1991:2), i.e. craft and technical skills, along with similar categories in the service sector. These skills are generally considered to be around the level of National Vocational Qualification Level 3 (NVQ3), although Senker (1996) found that among a number of engineering companies, level 3 was below that required for craftworkers. Rolfe et al (1994) classify the intermediate level as employees with advanced technical skills and/or supervisors, but that the levels and types of skill vary considerably across sectors and occupations.

11. Elias and Bynner (1997) provide a wide range of examples of intermediate level occupations. These include traditional skilled trades, such as fitters, welders and bricklayers, and an immense range of non-craft occupations, such as nurses, hairdressers, estate agents, office managers, laboratory technicians, insurance brokers and sales representatives. These jobs illustrate both the extensive range that could be included in this category and the clear gender distinction between craft occupations, largely the domain of men and non-craft, which are typically held by women in the service sector.

Issues to be addressed

12.
- Is there any evidence for a shortage of intermediate level vocational skills?
- Can we identify a changing pattern of demand from employers for intermediate skills?
- How are jobs at the intermediate level changing?

- Is there evidence of either upskilling or deskilling?

- What factors are likely to determine the way that intermediate jobs are changing?

Skill shortages in intermediate areas?

13. Given the range of occupations classified as intermediary, can anything be said about shortages in these areas? There are a number of difficulties in measuring skill shortages which have been discussed extensively elsewhere (e.g. Green et al 1998). Nevertheless, claimed shortages or recruitment difficulties can identify 'problems' in the supply and demand for particular skills. The 1998 Skill Needs in Britain survey found that 42% of employers experienced recruitment difficulties during 1997-8, an increase from 35% in the previous year (DfEE/T&EA 1998). Survey evidence indicates that there are widespread skill shortages in information technology (IT) and construction (IDS 1998; IRS 1998).

14. The British Chambers of Commerce's survey of 60 organisations reported that there were more problems in manufacturing industries than in services. Nine out of ten organisations said that they had experienced skill shortages in the previous 12 months, and of those 9 out of 10 said it was due to lack of applicants of the right 'calibre'. The reasons given for the deficiencies were the requirements of new technology and higher quality standards and the effects of internal reorganisation and the loss of intermediate level skills through redundancies during the early 1990s. In IRS's own survey, IT was the worst shortage area (54% of respondents), due to the increased use of computers by businesses and the rising demand for programmers. Shortages of skilled manual workers were reported by 35% of respondents, with the most common problem in areas of engineering technicians' roles, such as electricians and machinists. Two thirds of the companies surveyed expected skill shortages to worsen.

15. From 1990-94, 800,000 jobs were lost in manufacturing (Wilson 1995), and according to the Centre for Labour Market Studies (IRS 1998), a million jobs were lost at the intermediate skill level between 1990 and 1992. How far the

cuts in employment are responsible for current skill shortages is difficult to prove, although evidence from the aerospace industry places much of the blame on the widespread redundancy programmes and plant closures that took place in the early 1990s (Lloyd 1998). Bosworth and Wilson (1994) argue that even with the decline in craft and skilled manual occupations, shortages still persist, reflecting the failure to train and the loss of skilled workers to other jobs.

16. Despite the introduction of modern apprenticeships aimed at the intermediate skill level, there has continued to be a decline in apprenticeship numbers and they remain low in IT, telecommunications, chemicals and related and textiles and clothing (Gospel 1998). Gospel argues that given the numbers so far, modern apprenticeships are unlikely to greatly increase the numbers of workers at NVQ level 3 and will have even less effect on higher level technicians and supervisory skills at NVQ level 4. The problem is blamed on employers who are not offering a sufficient number of good quality apprenticeship places. However, Maguire (1998) found a lack of suitable applicants, with employers being forced to recruit apprentices who did not satisfy basic qualification requirements.

17. The surveys outlined indicate that skill shortages are believed to affect significantly intermediate level occupations, in particular in IT and skilled manual areas. Part of the problem is a result of redundancies and job losses during the early 1990s and relates to business cycle changes. There is also evidence of a lack of supply of relevantly educated and trained individuals to undertake some of these occupations. Rolfe et al (1994), in their study of intermediate skills in engineering, chemicals, banking and hotel and catering sectors, found employers had few problems in meeting their needs for intermediate skills during the early 1990s (a period of recession). There were persistent problems in particular areas, such as instrumentation engineering and some difficulty recruiting school leavers for technical training.

Changing Skills?

Survey Evidence

18. This section seeks to examine the question as to whether skills in intermediate level occupations are changing and, therefore, what

consequences this has for future skill needs. The key problem is that there is no systematic surveying of job content and skill levels or how these have changed over time. Statistical evidence exists on changing occupational structures and how this may affect the numbers required in different occupations. Elias & Bynner (1997) from various sources, such as the New Earnings Survey, the Labour Force Survey and Census of Population, found strong evidence for a growth of intermediate level managerial occupations in finance and office management during the 1980s and 1990s, which, they argue, has particularly benefited women. In craft and skilled manual occupations, largely the preserve of men, there has been a relative decline and an absolute decline in the skilled engineering trades, employment falling by 100,000 in engineering between 1991 and 1994 (Lindley and Wilson 1995). Shifts in occupational groups generally reflect the changing industrial structure of the UK and predictions can be made about future employment levels. However, this tells us nothing about skill requirements within these jobs.

19. Two surveys have attempted to address the issue of skill levels by including questions about perceptions of skill changes. The 1986 SCELI research, based on a survey of six local labour markets, showed that respondents overwhelmingly reported that their own skills had increased or remained the same over the previous five years. The overall conclusion was that skill levels were generally increasing within employment (although less so for women), these increases were associated with advanced technology and deskilling was rare (Gallie 1994). Penn (1994) reports the results of the survey within the Rochdale textile and engineering industries. There was found to be widespread evidence of upskilling, although there were also some examples of deskilling. On the basis of interviews with managers in Aberdeen and Rochdale across a range of sectors, Penn et al (1994) found that microelectronic technology was associated with widespread up-skilling, particularly in the areas of machine maintenance and clerical work, although in some firms (mainly in the textile sector) there were reductions in skill levels.

20. The Employment in Britain survey (1992) claimed to show a sharp rise in the level of skill required at work, as a result of the rapid spread of new technology and changes in the nature of skills required. 73% of technicians

and supervisors, 70% of lower non-manuals and 64% of skilled manuals reported that their jobs had increased in skill over the previous five years (Gallie & White 1993). This was argued to be due to the development of computerised technology and for men, higher levels of task discretion and increased responsibility, while social skills were more important for women (Gallie et al. 1998). There was also found to be a general movement of skills from manual dexterity towards monitoring and social skills.

21. A more recent survey (Green et al 1999) focuses directly on skills and has the advantage of being able to ask individuals more sophisticated questions about their jobs. These questions include assessments of changes in educational and training requirements, along with the importance of particular skills to an individual's job. In comparison with the 1986 SCELI survey, craft and related employees were more likely to claim that lengthier training was currently required to undertake their own job, while associated professional and technological employees were likely to be more highly qualified. In asking more directly about skill changes, on average there were found to be increases in problem solving, computing, communication and social skills, while manual skills were becoming less important. However, this has not been broken down into occupational categories.

22. From the surveys the overall results show an upward movement in skill changes, with only around 16% in the most recent skills survey excluded from these positive changes. However, subjective self-evaluation of an individual's skill changes in response to a structured questionnaire provides relatively limited data with which to understand or evaluate occupational changes (Claydon 1994; Lloyd 1997). The weaknesses, particularly of the earlier surveys, can be seen in relation to the use of computers. This can be perceived to automatically involve an increase in skills, while respondents (either individuals or managers) fail to recognise those skills which are no longer used. As a result of the limitations of surveys and their lack of detail on occupations, the main part of this paper reviews some of the existing case study research. This provides some evidence of detailed changes in jobs; what types of skills are now required, which ones are no longer needed and to consider differences between firms, industries and countries.

Case Studies

23. There is a considerable amount of case study material which includes some reference to skills, yet detailed assessments of how intermediate occupational skills have changed, are much more limited. Below is a summary of Lindley's (1991) survey of case study research undertaken during the 1980s and outlines what he believes are the implications for intermediate occupations.

> Supervisors - increased responsibility for a greater mix of capital equipment and skilled employees, more emphasis on communication and motivation of employees.
>
> Professionals - possible change in relationships between professionals of different levels and expansion of lower grades, e.g. nurses, programmers, lab technicians, to take on roles previously undertaken by higher professional groups.
>
> Non-manual occupations - clerical, secretarial and sales, there may be a requirement for higher quality customer service, greater knowledge of products, communication skills, computing knowledge. Reduction of routine operations and the emergence of a multi-skilled, multi-functional office-based occupation. The net effect is highly uncertain but 'the content of the average job will tend to rise quite substantially'.
>
> Craft workers - new technology has a number of consequences, including removal of the job, deskilling, reskilling, multiskilling and upgrading. There is some evidence of multi-skilled, multi-functional worker, but overall decline in numbers.

24. This paper does not attempt to survey all the relevant literature since the late 1980s but to select a number of examples that cover some of the intermediate occupational groups in craft and non-craft occupations in manufacturing and the service sector.

Craft Occupations

25. Much of the research on craft workers has involved examining the impact of computerisation on skills, particularly in the engineering sector. The evidence

suggests that there is not a single direction of skill change, largely because of the variations with which technology and skills can be combined. Senker and Senker's (1994b) evidence on the impact of information technology (IT) on skills in manufacturing found that there was a wide degree of choice associated with the technology. In one plant, management may integrate processes and use multi-skilled operatives to perform basic maintenance and programming, and in another plant they may keep skills more specialised and limited. Their review of the case study material in engineering concluded that it was difficult to predict the impact of numerically controlled and computer controlled machine tools on engineering skills and qualifications. The expectation was one of deskilling, but there was evidence of both deskilled work and enriched work (see also Sels 1997). Senker and Senker argue that this is not the result of the form of new technology but wider political and social factors. 'Work organisation is also influenced by management's motivation for implementing IT on the shopfloor, existing skill levels and trade union power' (Senker & Senker 1994b:60).

26. Finegold and Wagner (1998) made a similar finding in their study of the German pump industry. They claimed that the existing workplace structures the choice of skill changes and that the institutions, skill mix and product markets can have a strong influence on firms' strategies. The level of skill and the forms of work organisation used were largely related to the nature of the product. For those producing for customised or small batch markets, there was felt to be a continued requirement for broad and specialised expertise, while multi-functional team working was more appropriate for standardised products and a less skilled workforce.

27. The constrained choices open to management are highlighted by Thompson et al's (1995) study of the vehicle industry, where automation is shifting requirements from dexterity and other manual skills towards cognitive abilities and to skills relating to machinery and production processes. This involves both organisational and technological abilities and working in teams. They argue that despite the same skill requirements of the production process, there was a preference for different types of labour inputs in particular companies or countries. In Austria craft labour was seen as an essential

precondition for efficiency, while in the UK cases, craft workers were seen as a barrier to flexibility and, therefore, a skill that needed to be removed.

28. Scott and Cockrill (1997) studied 46 small and medium engineering firms in Wales and Germany and found endemic shortages of skilled workers in Wales. 83% of the Welsh firms reported repeated shortages of particular skills or difficulty in recruiting, with the greatest problems in the area of intermediate skills. There were found to be key weaknesses in the quantity, quality, transferability and transparency of engineering skills and that multi-skilling was often about making skills more firm-specific which, they argue, further hinders 'skill transferability on the external labour market' (1997:820). Senker (1996) supports this view, arguing that craft skills in the UK are still relatively narrowly defined and offer limited transferability within the engineering industry.

29. In areas such as welding, Mutch (1998) claims that the basic nature of the trade has not altered. The desire for flexibility and the strict requirements for quality controls mean that welds have to be completed by coded welders and such skills require continual practice. Although there has been a decline in the number of welders during the 1990s, there still remains between 80,000 and 100,000. In the area of fusion welding (spot welding he argues was always considered semi-skilled), manual welding is preferred because it provides the flexibility to adapt to the technical needs of the process and to market demands. He claims that there will be a continued requirement for skilled welders.

30. The clothing industry provides an example of where computerisation has largely deskilled the affected craft workers in the pre-assembly areas of production (Cockburn 1985; Lloyd 1997). The move away from manual tools requires fewer operators and, particularly in the areas of lay planning and cutting, evidence suggests substantial deskilling. For cutters, their jobs have changed from one of organising the work, sequencing and manual cutting, to setting and monitoring of the machine. This has substantially reduced the number of cutters required and the skill needed, whilst new skills have been created largely for mechanics and computer programmers. Some managers saw the removal of craft workers as one of the key benefits of

computerisation, in that these workers had considerable discretion and control over their work, took several years to train and were traditionally a stronghold for union organisation (Lloyd 1997).

31. The implication of computerisation for maintenance workers has been a drop in numbers but also a requirement to develop new skills to deal with the new technology. However, Senker and Senker (1994a) reported that skill shortages in maintenance within the UK have limited the benefits associated with IT. Rolfe et al (1994) present evidence that new technology in chemicals has raised skill requirements at the intermediate level, as a result of team working and multi-skilling. Other changes in production systems, such as just-in-time, total quality management and modular production, do not seem to have transformed assembly workers' jobs into intermediate skill level occupations (Elger 1990; Delbridge et al 1992), although it does imply an increasingly important role for the supervisor (Senker and Senker 1994b).

32. The main evidence suggests that new technology has not had the effect of deskilling craftworkers' jobs but, along with the contraction of manufacturing industry in the UK, has substantially reduced the numbers required. Many of the studies report that technology does not define skill but that other factors shape choices about the use and development of employees, these include national industrial relations systems, the labour market and corporate strategic choices (Thompson et al 1995); wider political and social factors (Senker and Senker 1994b); managers, unions and employees (McLoughlin and Clark 1994); workplace institutions and practices (Heyes and Stuart 1994); and the existing skill base (Knell 1993).

Non-craft occupations

33. There is much less evidence available about changes in skill levels within the non-craft occupations, areas dominated by female employees in the service sector. Financial services, employing around one million workers, is one area where there has traditionally been large numbers of workers with intermediate skills and where there has been a major shift away from the recruitment of substantial numbers of qualified school leavers. Although many areas are expanding, retail banking experienced a fall in employment of 18% between

1990 and 1995 (Thornley et al 1997), as a result of mergers and acquisitions, rationalisation and computerisation.

34. The evidence indicates a growing segmentation of the labour force. Graduates have been recruited in increasing numbers, instead of school leavers, with opportunities to fast track into managerial positions, a movement away from professional examinations and a shift from more general skills to more specialised roles (Storey 1995). At the same time, computerisation has reduced lending discretion within branches and, thereby deskilled traditional banking jobs. Although many routine clerical operations have been automated, there has been a centralisation of a variety of enquiries and operations into call and clearing centres, with the requirement for lower level skills (Thornley et al 1997; Kinnie et al 1998; Coyle 1995; Rolfe et al 1994). Thornley et al (1997) argue that these developments have been associated with increasing feminisation of the workforce and a continued division between the highly qualified and mainly male segments and increasing numbers of female employees on part-time and temporary contracts.

35. For the remainder of branch employees, Storey (1995) argues that there is a considerable degree of uncertainty as to whether branches are to be limited to sales outlets and require narrow skills or whether they will offer a broad range of services that will require wider and more in-depth skills. Kinnie et al (1998) support the view that the personal interface with customers at branches is requiring higher quality employees, but they are a lot fewer in number. However, both Thornley et al (1997) and O'Reilly (1992) argue that any multiskilling or functional flexibility among branch staff has been within fairly strict boundaries and has not been accompanied by an effort to upgrade the skills of the workforce. Functional flexibility was considered to be more developed in France where there was a more extensive system of training, a more integrated cashier service and smaller branches.

36. Similar to banking, automation has eliminated some of the least skilled clerical jobs and the most skilled clerical jobs in insurance, e.g. the rater who determined the price of the policy has largely been replaced with the aid of computer programs, leaving routine data entry jobs (Appelbaum & Albin 1989). However, new jobs of customer service representatives are also being

created and this can involve selling insurance, explaining and answering customer questions and complaints. Appelbaum and Albin found evidence, that as with the craft occupations, there was a choice about how technology was used and how jobs were designed, which could either fragment workers' skills or integrate tasks and enhance their skills.

37. Other areas such as software development, a leading area of skill shortage, also show some evidence of a range of skill changes (Beirne et al 1998:159). Grundy (1996) argues that there has been a rationalisation and automation of certain types of work into routine jobs, leading to a development of a gendered division of software labour, with women concentrated in low status 'specialities', such as merging and tidying databases or writing summary report programs. However, Beirne et al (1998) claim that there are limits to this rationalisation because of the complexity and subtlety of software projects and the need for tacit skills and informal practices. Therefore, skills are still likely to remain important.

38. The other key area of research has been about job changes within the health service, largely revolving around shifts in the occupational boundaries rather than technological developments. Nurses and midwives have been covering specific medical tasks and extended role functions (Harvey 1995), although the requirements for higher level qualifications could be seen as pushing these groups out of the intermediate skill categories. High rates of turnover and the failure to address relative pay has led to substantial recruitment difficulties (Bosworth and Wilson 1994), while Harvey (1995) argues that extended roles may have intensified these problems, as more work and responsibility are expected with no greater autonomy, remuneration or satisfaction. Despite the potential for expanding numbers of intermediate occupations within the health service, funding pressure is leading to the greater use of lower skilled assistants (Coyle 1995) and the removal of clinical posts for associated professions such as physiotherapists, radiographers and scientific officers (Lloyd & Seifert 1993, Hall 1992).

39. The non-craft intermediate groups are much more difficult to assess than craft groups and the occupations are far more varied. There seems to be evidence of deskilling taking place within particular areas, although within a context of

overall gains in employment in these sectors. Many jobs appear to be fragmented and divided into more skilled and less skilled occupations, although the extent to which this process will continue is unclear.

Assessment of the Evidence

40. The contraction of the manufacturing sector and the introduction of new technology have contributed to the widespread decline in traditional craft vocational occupations. Bosworth and Wilson (1994) predict a continued fall in the number of jobs for craft and skilled manual workers. From the evidence, it would seem that there has been a change in the type of skills required when dealing with computerised machinery. This has changed the nature of some of the tasks away from manual skills to more organisational and technical skills, but there is not much support for the view that the effect has been to substantially deskill craft workers or that apprenticeships are no longer required. However, there are certain exceptions, such as the textile and clothing sectors, which have experienced substantial deskilling of craft jobs.

41. In non-craft occupations, predominantly within the service sector, it is far more difficult to present general movements in job content. For some areas, such as hairdressing, chefs, sales reps and estate agents, there have either been few technological changes or a lack of research into the changing nature of their jobs. In many areas the high proportion of women employed in particular occupations may have led jobs to be considered at lower levels than intermediate skills, for example childcare or secretarial, clerical and administrative work. The expansion of the service sector has increased the demand for employees at the intermediate level. However, there is evidence in some areas of a polarisation of the workforce, with divisions into a larger group of lower skilled workers undertaking routine operations and fewer, more highly skilled workers with more specialised knowledge.

42. The evidence provided here on changing occupational skills shows a complex picture of developments taking place within the UK. Overall, there is no one way that skill levels are changing, rather jobs are evolving and developing in different directions. The case study research contrasts with the more positive results of the survey evidence which have found generalised skill increases.

This may reflect the limitations associated with the different methodologies, although the use of more sectoral based research is overcoming much of the criticism about lack of representativeness of individual case studies. As a result, there is clearly a need to consider the relative merits of the two approaches and to understand why the outcomes seem to vary.

43. The case study research reinforces the point that technological change does not in itself determine the occupational skills required. In particular, when making comparisons about the application of technology in different workplaces, sectors and countries, many of the studies argue that both the choice and use of technology depends on a variety of factors; such as managerial strategy, existing skills, workplace practices, trade unions and product markets. In one workplace an existing supply of skills may lead to the use of technology that harnesses these skills to produce more complex products, small batches or a higher quality service. In another, those skilled workers may be considered a 'threat', that is employees have too much power or may be expensive to recruit and train, therefore, management may use technology to remove those skills and reduce costs with a semi-skilled workforce. In the case of the UK, it would seem that a large number of firms are competing on the basis of this latter option (Keep & Mayhew 1998).

Issues to be Considered

44. The evidence of a shortage of intermediate level skills is not altogether clear. Certainly a problem exists, in terms of matching the supply with demand and in the quality and quantity of training provided. For craft occupations, whenever manufacturing industries expand, skill shortages arise and during recessions there are large-scale redundancies of those same skills. To overcome the problem of shortages, there is a need to focus on how to retain skills during recessions, i.e. how to reduce large fluctuations in employment, and how to encourage firms to plan for future expansion and labour turnover, given the two to four years training requirements.

45. For non-craft occupations, there seems no overwhelming evidence of shortages of labour, with the exception of the health service (which has very specific labour markets and associated problems) and IT areas. The main issue is whether the current mix of skills, i.e. the use of greater numbers of

graduates and large numbers of unskilled/semi-skilled, as opposed to more intermediate-level employees, is appropriate to policy aims of a high skill, knowledge-based economy.

46. Predicting occupational skill changes and the needs of employers in the future depends on the extent to which wider factors are considered to be fixed. How far are we assuming that the existing structure of the economy and product markets will continue? To what extent are we trying to move to more up-market production? Any attempt to aim at higher quality markets does raise the question as to whether there would be an adequate supply of intermediate skills, particularly given the current shortages within the manufacturing sector.

47. Improving the supply of intermediate skills will not provide the necessary demand from employers to use those skills. For example, existing product market strategies, traditional employment policies and practices and lack of institutional support would all need to be addressed in attempting to improve the utilisation of skills.

Part 2

Intermediate skills and productivity - How the UK compares

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The Issues

48. This paper concentrates on two issues associated with intermediate level skills in Britain; supply (including modes of production) compared to other competitor countries and the importance of intermediate skills for productivity.

49. This paper identifies stocks of intermediate skills in terms of the recognised vocational qualifications held by individuals at levels equivalent to NVQ Level 2 and NVQ Level 3 together with two-year vocational qualifications at NVQ Level 4 equivalent - normally HNC and HND qualifications. It can, of course, be argued that many more individuals are competent at these levels than hold recognised qualifications. This is undoubtedly the case, but for the purpose of reliable statistical measurement only qualifications reported in Labour Force Surveys and equivalent surveys in other countries can be included. There are probably more individuals in the UK with unrecognised intermediate skill levels than in other countries as a result of the lack of importance attached by employers to formal vocational qualifications - in other European countries surveyed here the recognition of vocational qualifications in collective agreements on pay differentials is widespread. However, it should also be remembered that the definition of 'recognised qualification' used in the British LFS is far more wide-ranging than that used in eg France or Germany. In Britain all vocational qualifications are accepted in the LFS survey, including those from private sector awarding bodies whereas the large number of qualifications awarded by private-sector organisations in other countries are normally excluded from the official statistics.

50. Intermediate level qualifications certificate skills in a wide range of occupations. Traditionally, recognised craft skills in manufacturing and construction constituted a large proportion of intermediate qualifications. Currently, however, the composition of vocational awards at NVQ Levels 2 and 3 is dominated by awards classified to Business and Management, Health and Social Care and Culture, Society and Education (Table 1).

Table 1 Full vocational awards at Level 3 by selected subject areas: percentage of all awards at NVQ Level 3 1995/96	
Subject Area	Level 3
Business & Management	25
Culture, Society and Education	11
Health & Personal Care	10
Computers, Electrical and Electronic Engineering	11
Architecture and Construction	4
Engineering Production and Industrial Design	7
Per cent of all awards at this level	68
Source: DfEE Statistical Bulletin Issue No 7 June 1997 Table 6	

51. The last two decades have witnessed growth in technician, junior manager and associate professional employment categories and a decline in unskilled, semi-skilled and some skilled blue collar employment. As a result, the composition of jobs requiring skills which come within this definition has been changing. But while the demand for employees able to function effectively at these crucial intermediate levels has expanded, especially in the service sector broadly defined, the supply of newly-qualified individuals has hardly increased during this same period. Firms have substituted individuals with general academic qualifications, many of them with degrees and individuals who have acquired the relevant expertise through experience. Even so, the most visible type of skill shortages have been reported at the intermediate level as the economy has grown over the past seven years. These can be regarded as the tip of the iceberg with a much larger 'hidden' skill shortage manifesting itself only in poor productivity levels relative to other European countries where stocks of intermediate skills are considerably greater. The following section supplies evidence of stocks of intermediate level skills in the UK relative to other European countries. A brief survey indicates the main modes of production of intermediate vocational qualifications in other European countries. There then follows an analysis and decomposition of the most recent period of growth in qualifications of young people since 1988 and an overview of modes of production of intermediate vocational qualifications in Britain and some other European countries. Research based on investigation of matched samples of plants in Britain compared to other European countries is quoted to illustrate the way in which intermediate

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vocational qualifications can contribute to raising productivity levels in manufacturing and in services.

Stocks of intermediate level qualifications in the UK compared to other European countries, Singapore and the US

52. In 1996 the Centre for Economic Performance carried out a Skills Audit commissioned by the DFEE in which equivalences of intermediate level qualifications were determined through the evaluation of the standards of the relevant syllabuses, examination papers and assessment standards.

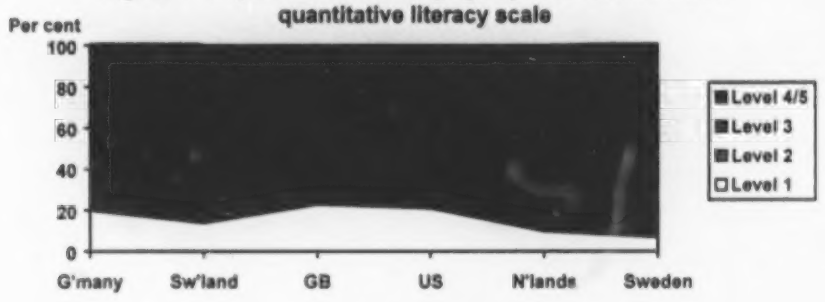
53. A benchmarking exercise was then conducted, based on the equivalences established, showing the position of the UK in terms of stocks of intermediate level skills compared to a number of competitor countries - France, Germany, Singapore and the US. The use of examination papers etc as a basis for determining equivalence made it possible for more precise and robust judgements to be made about the UK position relative to the other countries in terms of stocks of intermediate level skills than had previously been possible. For example, a detailed evaluation of the standards required for a German apprenticeship (bricklaying) by two independent British evaluators made it possible to state with considerable confidence that the German apprenticeship could not be set equivalent to anything lower than an NVQ 3 standard (Steedman, Green et al 1997).

54. Using these quite precise measures, the Skills Audit found that just over one third of the British population of working age had any sort of intermediate qualification - academic or vocational. In Germany two thirds of the population held an intermediate qualification and in France around half were qualified at this level. Singapore and the US were similar to the UK with around one third holding intermediate level qualifications. These proportions did not alter significantly when a younger age group was examined (Green and Steedman 1997).

55. The comparison of stocks of qualifications in the UK population has now been extended and updated and we can now include two more European countries, Sweden and the Netherlands. It has not proved possible to base equivalences for these additional countries on detailed analysis of

examination papers and the definition of the intermediate skill category has been based upon the conventions used by EUROSTAT. These define the intermediate skill category as comprising the population that has completed the period of compulsory secondary education and obtained an additional qualification (vocational or academic) requiring at least one further year of full-time study and below the tertiary level. However, we feel confident in assuming that the standards of the Swedish and Dutch intermediate qualifications are at least as high as those of the UK as we now have an additional source of information on standards of competence of those populations compared to the UK, namely the International Adult Literacy Survey (IALS) carried out jointly by the OECD and Statistics Canada.

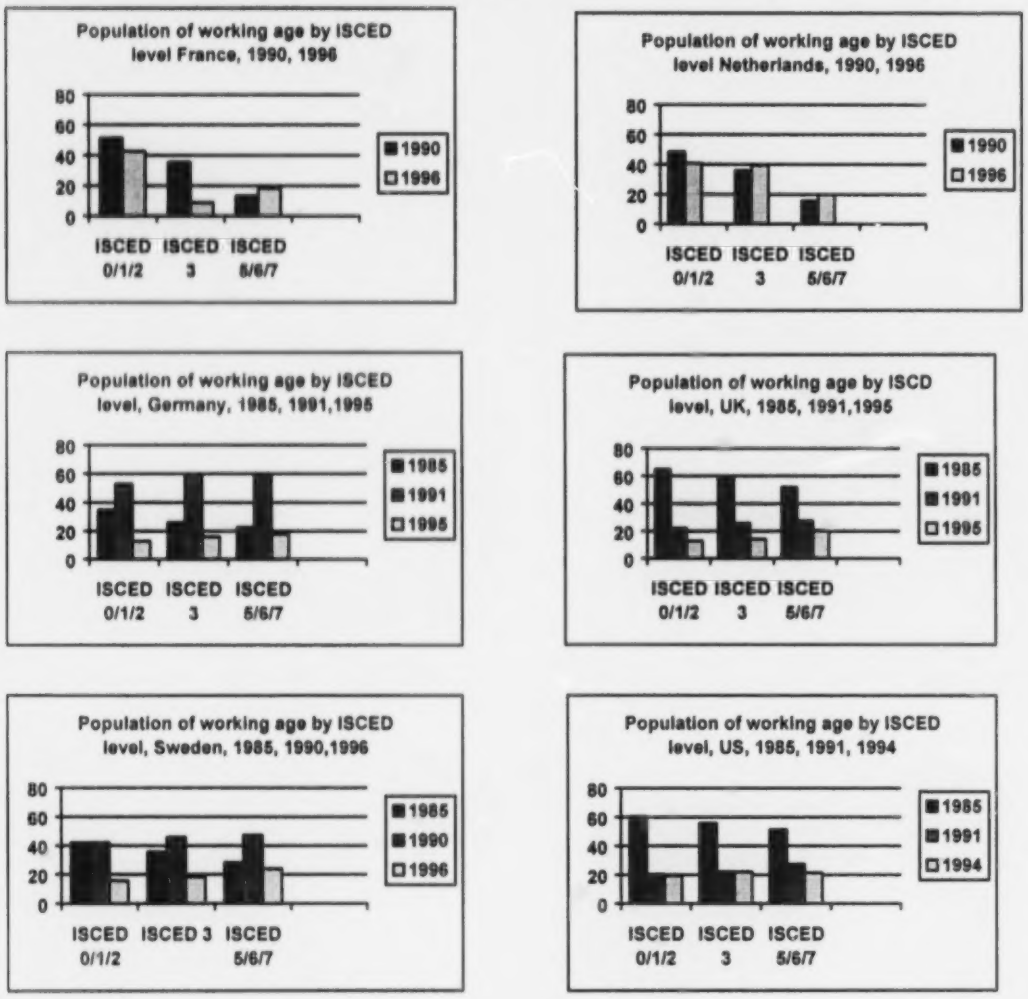
Figure 1 Population of working age by IALS Levels 1-5 on quantitative literacy scale



Source: OECD Literacy, Economy and Society 1995
Quant'ty literacy all of working age
ONS Adult Literacy in Britain 1997 Table 6.1
Quantitative literacy all of working age Level 3

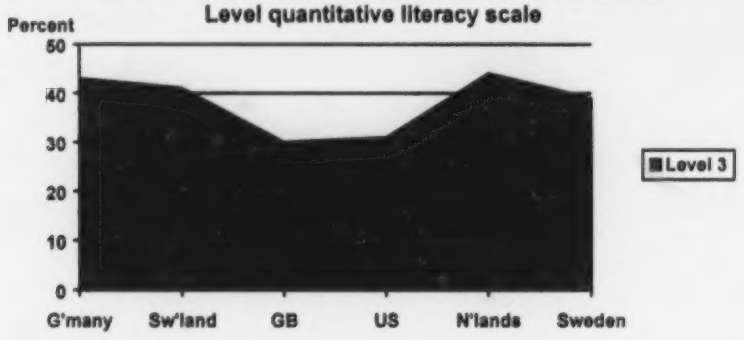
56. The IALS analysis, based on performance on a test of three types of literacy, prose, document and quantitative literacy divides the population between four literacy levels Level 1 contains those illiterate or at a very basic level while the top levels 4/5 contain those with graduate -level literacy skills. The IALS results confirm the broad judgements previously made in the Skills Audit on the basis of examination papers, although it must be stressed that it is not possible at present to 'read across' from the IALS Levels to national qualifications (OECD/Statistics Canada 1996, ONS 1997). But we can see from Figure 1 that the UK and the US have very similar (high) proportions at the lowest level on the scale used here (quantitative literacy); the Netherlands, Germany and Sweden have only half the UK/US proportion (check) at Level 1. [Note that IALS results for France are not available]

Figure 2 Percentage of population of working age by ISCED level and country



57. Figure 2 shows skill profiles for five European countries and the US for the population of working age. Looking at the European countries we can see that both Sweden and the Netherlands have around 40 per cent at the intermediate skill level while the UK and the US have around one quarter of the population at this level. In the case of both the UK and the US the low proportion at Level 3 is the result of having around half the population in the lowest category (ISCED 0/1/2 ie. no education and training after compulsory schooling. Germany stands out in this comparison having nearly two thirds of the population at Level 3 and Sweden is close behind with nearly half the population at Level 3.

Figure 3 Proportion of the population scoring at IALS Level quantitative literacy scale

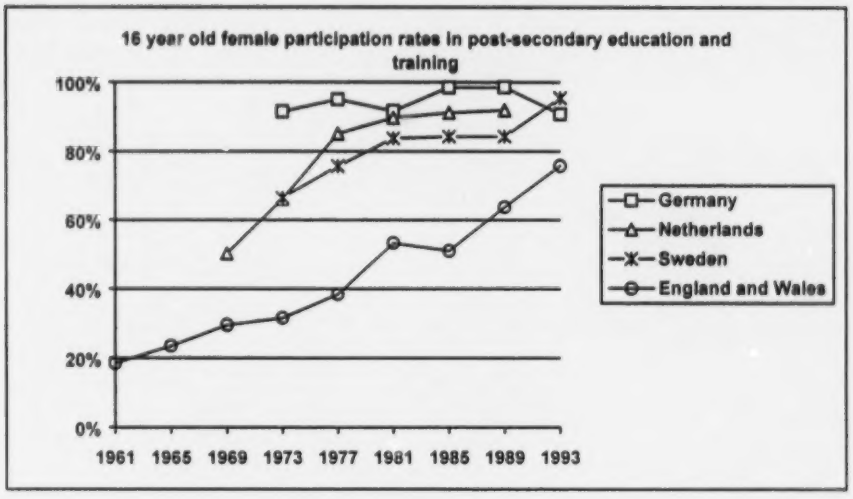


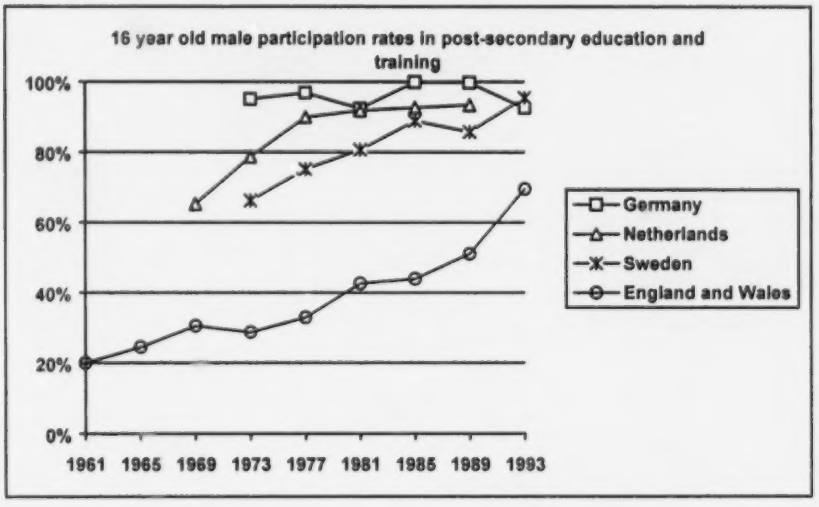
Source: OECD Literacy, Economy and Society 1995
Quantity literacy all of working age
ONS Adult Literacy in Britain 1997 Table 6.1
Quantitative literacy all of working age Level 3

58. Skill profiles are continuously changing as a result of the outflow of older workers - in the European countries these are usually less-qualified than the younger cohorts - and as a result of the inflow of younger populations. Figure 2 shows that in all the European countries the low-qualified group (below intermediate level) has been declining over the last decade, largely as a result of more qualified younger people entering the population of working age while less-qualified older people leave. But Britain and the US continue to have a far higher proportion at the lowest skill level. The IALS results confirm that this is a **'real skills'** deficit. Figure 3 shows the lack of IALS Level 3 skills measured on the quantitative scale in the UK and the US compared to the other European countries.

59. From 1985-1991 the UK and the US had lower rates of decrease in the low-qualified than the other four countries in this comparison. At the same time, the UK and the US had the largest proportions with no intermediate or higher qualifications. But after 1991, the situation reverses itself, and the UK and the US have the highest rates of reduction of the low-qualified. This suggests that the UK started reducing the low-qualified group in the population by producing more highly-qualified younger people **later** than in other European countries.

Figure 4





60. This is confirmed by Figure 4 which shows flows of young people aged 16 into post-compulsory education in four of our countries - Germany, the Netherlands, Sweden, and England and Wales for the last thirty years. The UK started very late in reducing the low-qualified group of young people joining the population of working age. As a consequence, the skill profiles of a young age group show greater differences between the UK and other European countries than are apparent in the population of working age (Murray and Steedman 1998).

61. In 1985 there were already substantial differences between the other European countries and the UK with respect to the younger age group (25-28) in 1985. Only 18 per cent of young Germans, and 22 per cent of young Swedes lacked any further qualification post-16 compared to 56 per cent of young persons in the UK. So these countries had drawn well ahead of the UK by 1985. Around the mid 1980s, as Figure 4 shows, the staying-on rate into further education and training started to rise more rapidly than in the past in the UK and by 1996 the effect of that change is beginning to make itself apparent in the 25-28 age group. In 1996 only 46 per cent of the young age group in the UK were in the low-qualification category. But we should also note the well-known 'running to stay in the same place' phenomenon. Other countries were also continuing to reduce the low-qualification group over this period. Admittedly, the rate of reduction of the low-qualifications group in the UK between 1990 and 1996/7 was the highest of all our countries, but other countries did not stand still and most had achieved a considerable advantage over the UK by 1985 as a result of higher post-16 enrolments prior to that date (McIntosh 1998).

62. We can also carry out some very simple extrapolations to make some tentative predictions about changes in the composition of the population of working age. We make three assumptions, first that the rate of reduction of the low qualifications group remains constant, second that the annual decrease is of the same order as for the period 1990-1996, and third that the relative sizes of youngest and oldest cohorts of working age do not change. Making these assumptions, we can predict that Germany and Sweden will probably have less than 10 per cent of their working-age population at the low qualification level by 2010. But for France, the Netherlands and the UK this level may not be achieved until around the year 2020 (Murray and Steedman op.cit.)

International comparisons of skill stocks by sector

63. Figures 5-9 show employment in five large employment sectors, Food Processing, Construction, Engineering, Hotels and Catering and Business Services by skill level for four countries, the UK, France, the Netherlands and Germany. Level 2 (ISCED 0/1/2) is all those with no education or training beyond school-leaving qualifications, Level 3 (ISCED 3) is the intermediate skill level and

Level 5 (ISCED 5/6/7) is all those with some tertiary level education including degrees and higher degrees. These charts largely confirm the picture for the population as a whole already presented. That is, in every sector (except construction where the UK has the same proportion as France) the UK has the lowest proportions at Level 3 and the highest at Level 2 of all the four countries. Business services is clearly a sector which requires a high level of qualifications in its employees, in all countries over 30 per cent of those employed in this sector are at Level 5 and the UK has a slight advantage at this level over all other countries. But the UK has by far the lowest proportion at Level 3. In the Netherlands and Germany over 80 per cent employed in this sector are at Level 3 or above while in the UK just over 60 per cent are at Level 3. Taking by contrast a so-called 'low skills' sector, hotels and catering , similar contrasts emerge. Over half of those employed in this sector in the UK are at Level 2 compared to around 30 per cent in the Netherlands and Germany.

Changes in the composition of skill stocks in the UK 1986-1996

64. As mentioned above, a very great change took place in the participation rate of young people in post-compulsory education in the late 1980s. After years in which our participation rate lagged behind that of other countries 1988 saw a sharp acceleration in the slow upward trend and our rates started to approach levels that had been found in other European countries since the early to mid-1970s (Steedman and Green 1995)

Figures 5-9 Percentage of people employed in selected industries by ISCED level

Fig. 5 Employment in Food Processing (NACE15)

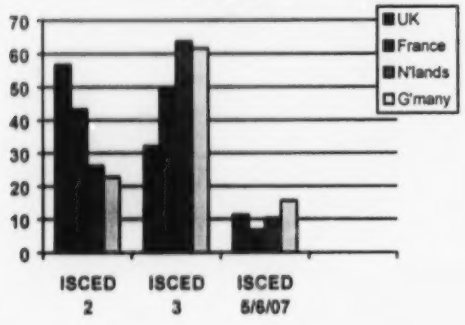


Fig. 6 Employment in Construction (NACE 45)

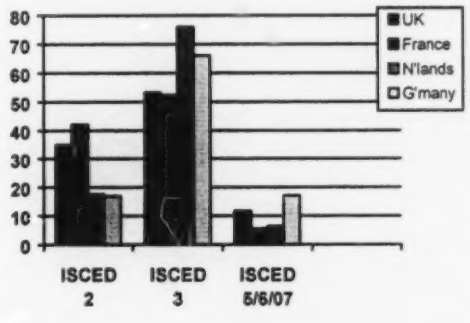


Fig. 7 Employment in Engineering (NACE 29)

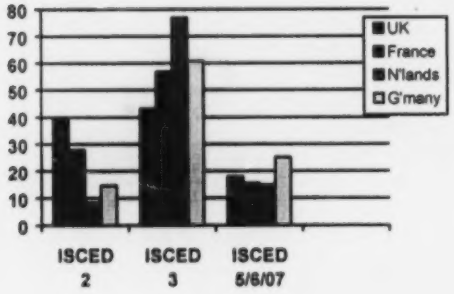


Fig. 8 Employment in Hotels and Catering (NACE 55)

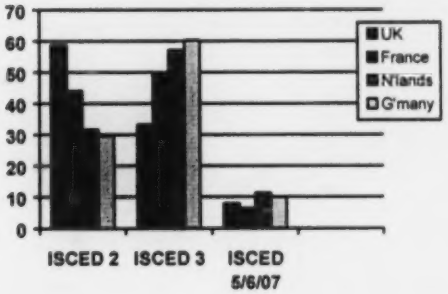
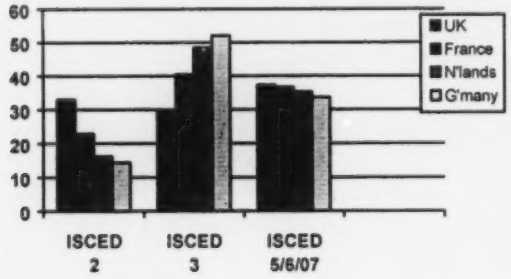
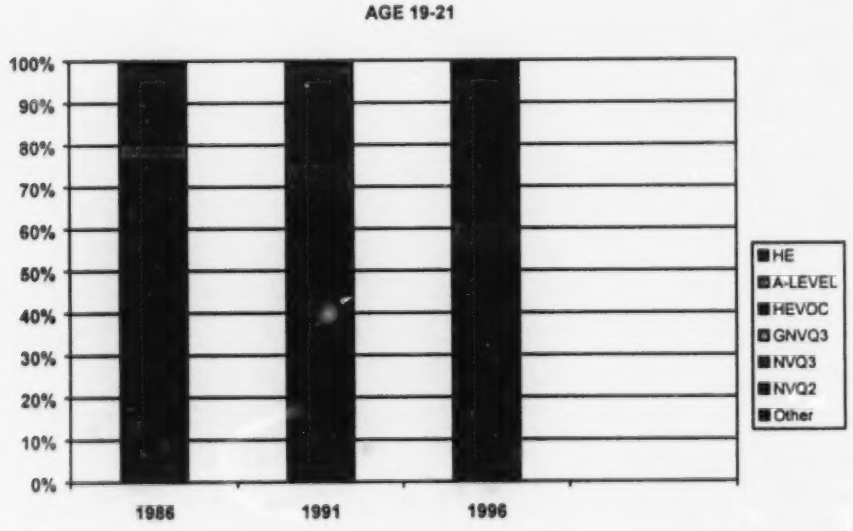


Fig. 9 Employment in Business Services (other than financial) (NACE 65)



Source: data supplied by CEREQ

Figure 10 Participation in post 16 education

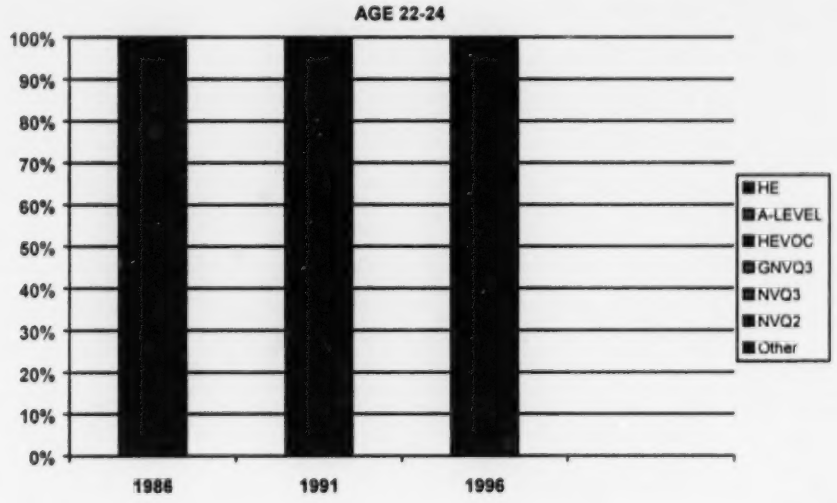


Source: Labour Force Survey

65. Figure 10 uses data from the Labour Force Survey analysed by the CEP and shows quite dramatically the impact of that step change in participation post-16. When we look at 1986 we can see the 'before' picture. The 'other' category includes all those who obtained no higher than one or more O-levels or GCSEs or a low level further qualification at NVQ Level 1. Nearly 70 per cent of young people aged 19-21 in 1986 fell into this 'other' category, that is they did no substantial education and training beyond compulsory education.

66. By 1991 we can just begin to see the results of the change in participation working its way through to the stocks structure as the 'other' category begins to shrink but by 1996 we can see a substantial change. Only just over 40 per cent are now in the 'other' category. My main interest is to examine here how those who left that category redistributed themselves between the various types of available qualification categories. In particular I want to draw attention to the relative growth of the different categories of qualification over time. Most of the growth over this period has been in the intermediate qualification category that was already the largest in 1986, namely A-level.

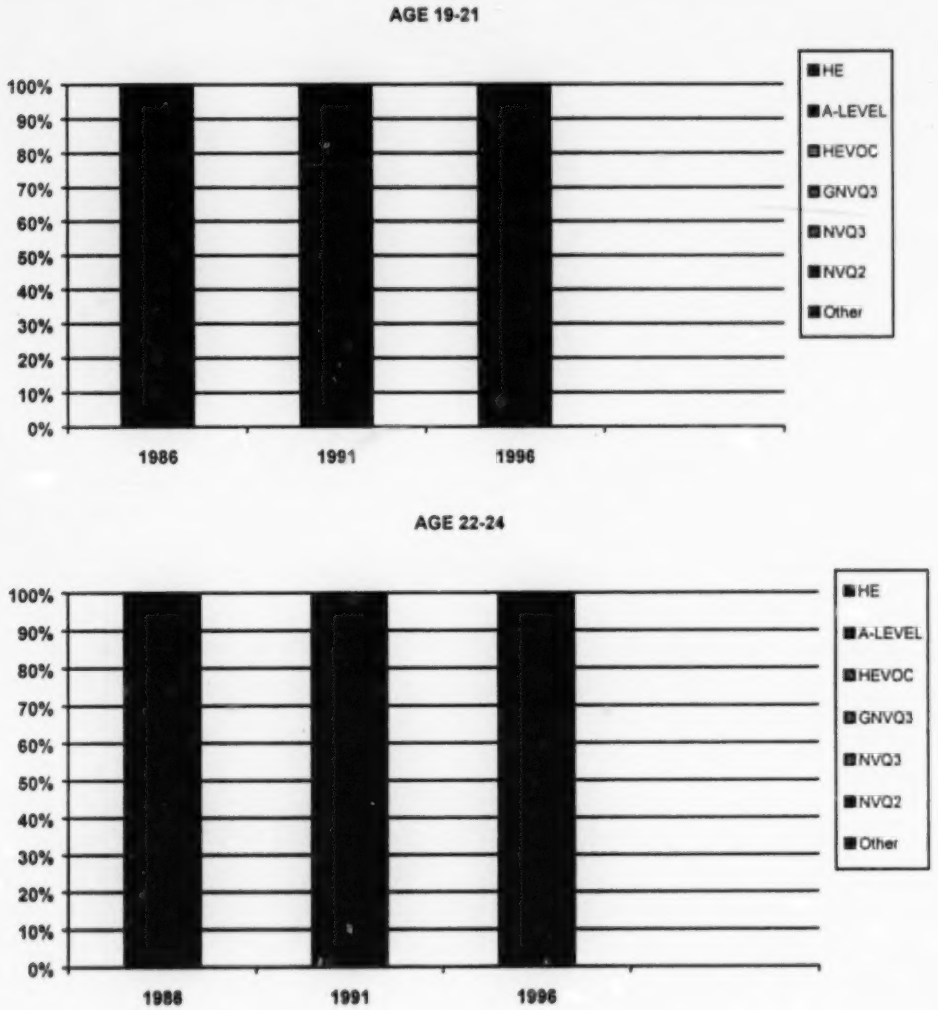
Figure 11 Highest qualification obtained



Source: Labour Force Survey

67. In Figure 11 we look at the same breakdown by highest qualification obtained but for all aged 22-24. For the study of the effect of changes in participation on the qualifications structure, 1996 is particularly interesting because it is the first year in which all those included came from the cohorts participating post-1988. So we can see the first effect of the higher post-16 participation. What we notice, however, is that the main action is again concentrated on the academic qualification category. A substantial number converted their A-level qualifications into degree qualifications between the ages of 21 and 24.

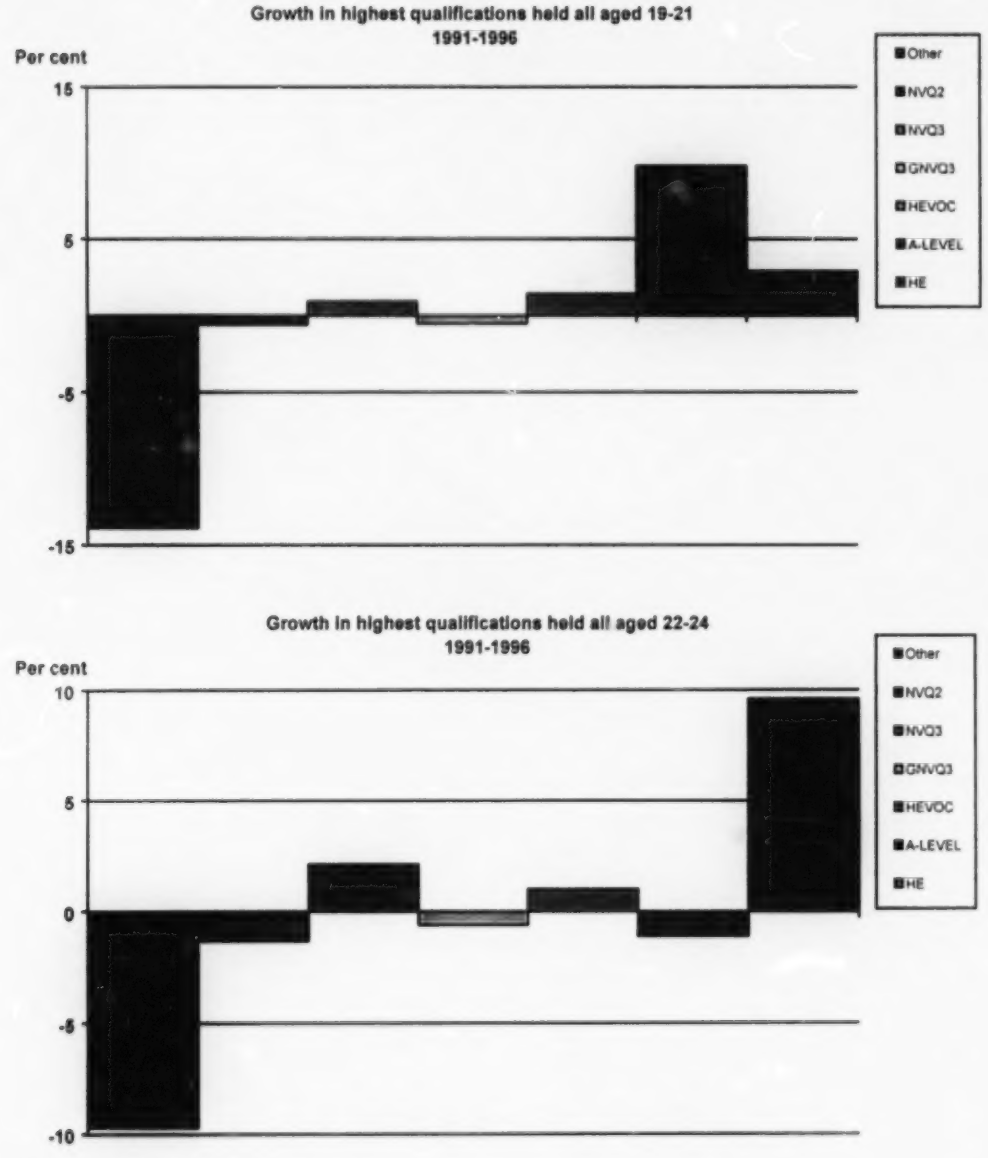
Figure 12 Qualification levels of those aged 19-21 and 22-24, UK 1986-96



Source: Labour Force Survey

68. But there was not much net *growth* when we compare the 19-21 year olds and the 22-24 year olds (Figure 12). The proportion of 22-24 year olds holding vocational qualifications [not giving access to Higher Education] defined as NVQ2 and NVQ3 remains small and unchanged between the 19-21 year olds and the 22-24 year olds.

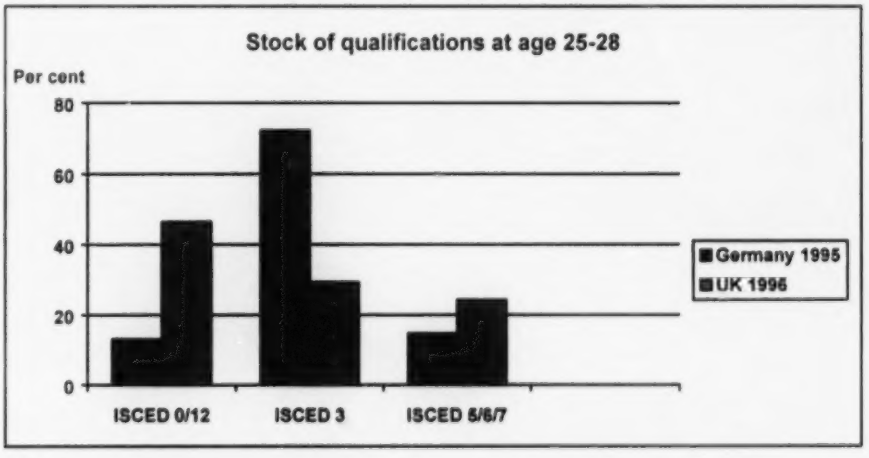
Figure 13



Source: Labour Force Survey

69. I think my point emerges most clearly in the next slide (Figure 13) which shows the percentage points gains and losses of the different qualification categories over the period of vigorous growth 1991 to 1996. What stands out most clearly is that growth has been overwhelmingly in academic qualifications, and that vocational qualifications - already with a very small share, have hardly increased. We can also see that, by the time young people reach the age of 22-24 in England, no-one much is hanging about at Level 3. They are all busy converting those qualifications that offer a route through to higher education into degree or sub-degree qualifications. This gives a very different 'skills profile' when we compare young age groups in the UK and Germany (Figure 14). There is one slightly misleading statistic with this comparison - the German degree level stock is low because many German students have not completed degree studies by this age. At the next age group up the percentage in Germany with a higher education qualification is similar to that in Britain and the percentage at Level 3 has consequently declined slightly.

Figure 14



Source: Murray and Steedman (1998)

Modes of production of intermediate level qualifications

70. Here I examine flows into the apprentice route in Germany. Apprentice starts in Germany in 1996 were 574,000. Only a minority were sixteen year old school leavers, most were aged 17 or 18. But they represent nearly two thirds of the 18 year old cohort. By contrast, starts on the Modern Apprenticeship were 85,000 in 1996 - just over 10 per cent of a cohort

(Steedman, Gospel and Ryan 1998). The huge German advantage in Level 3 skills has been built up almost entirely through the apprenticeship system. By contrast, in the UK expansion of participation in school Sixth Forms and in Further Education Colleges overwhelmingly produces more passes at A-level and more entrants to Higher Education and fails to develop vital intermediate technical and business skills which are widely recognised as contributing to explain Germany's higher productivity levels.

71. But at least one other European country, Sweden, has succeeded like Germany in qualifying around 60 per cent of young people to the intermediate skills level with a further 20 per cent in higher education. This has been achieved not through apprenticeship but through the full-time schooling route. But a crucial difference between the Swedish provision of further education (Upper Secondary School) and provision in England and Wales is that the Swedish further education route offers a full intermediate vocational qualification at the Level of our NVQ3 to around half of those who enrol. These vocational qualifications are widely recognised by Swedish employers as constituting the minimum level required for most intermediate occupations. Consequently there are strong incentives to complete the course. Drop-out and school failure are much less common in the Swedish Upper Secondary School than in England and this contributes to the higher Swedish qualification rate observed.

72. It is clear from the example of these two countries - and from others that could also be put forward if space permitted - that 80 per cent or more of young people can achieve qualifications at Level 3 or higher using either the full-time route or part-time based on apprenticeship. What appears to be essential to achieve this high qualification rate is a sufficiently wide range of provision of which a substantial part leads to recognised vocational qualifications. There are good grounds for believing that the failure in England to bring more than 60 per cent to any sort of intermediate qualification or higher level results from the failure to provide such a route. From the analysis presented above, it is argued that the full-time school/college route in England overwhelmingly provides a supply of academic qualifications at the intermediate level and that the full-time route to intermediate vocational qualifications (NVQ 3) is of little significance. Yet the

UK does have a part-time route to vocational qualifications - the Modern Apprenticeship. As the numbers reaching Level 3 through the A-level route start to level off it is to this route that we should now look to raise the proportion gaining intermediate qualifications to the levels of other European countries (Steedman, Gospel and Ryan 1998).

The link between intermediate vocational skills and productivity

73. Between 1984 and 1994 researchers at the NIESR visited 165 medium sized companies and establishments in five countries, Britain, Germany, France, the Netherlands and the US. Most of the visits were to firms in Britain and Germany and to manufacturing establishments. In addition to the samples of firms from manufacturing in the two countries - engineering, woodworking, clothing and food processing- a service sector - hotels - was also investigated. A summary is provided in Prais (1995).

74. The aim of this programme of research was to better understand how production of similar products might differ between companies with access to abundant skills (Germany) and companies operating in a low-skill context (UK). In particular, it was hoped to understand the contribution - if any - of superior skill endowment in Germany to the higher productivity levels observed in that country.

75. The programme of visits fully confirmed the conclusions previously drawn from analysis of statistics of the skill composition of the labour force, namely that around two thirds of the German workforce held a vocational qualification equivalent to NVQ Level 3 while the corresponding British figure was just over one quarter. In the German clothing manufacturing companies visited, around 80 per cent of the machinists employed had a relevant vocational qualification. In the British companies visited researchers were told that no machinist held any sort of relevant vocational qualification at that level. In the German hotels visited, chambermaids were usually unqualified, as they were in Britain but three quarters of the hotel 'housekeepers' in charge of cleanliness and maintenance of furnishings and supply of toiletries had served an apprenticeship covering the full range of hotel functions. In Britain, no hotel housekeeper had any vocational qualifications. This pattern was

repeated in all the sectors investigated in Britain and Germany and similar findings emerged in studies undertaken in the Netherlands.

76. In all the samples of companies visited the German productivity advantage based on measures of physical productivity adjusted for quality differences was clearly evident. One of the problems that faced the researchers was the fact that in all the sectors visited the British sample, chosen to be representative of the sector in Britain, produced a lower quality product than the German sample which was representative of that sector in Germany. The firms producing kitchen furniture in Britain produced for stock in a limited range of colours and designs; the German companies produced to order using advanced production planning techniques based on IT. Their product combined some mass production of standard parts with customization to clients' individual requirements in a wide range of designs and colours. That type of customization could only be found in small artisan-type workshops in Britain which could not take advantage of the economies of scale which the German production enjoyed. In the hotel sector, German hotels were found to require only 68 per cent of the employees per guest night in London hotels and a mere 46 per cent of the employees in English provincial hotels.

77. Quality-adjusted productivity measures of biscuit production showed that the three other European countries studied (France, the Netherlands and Germany) produced roughly a third more value per employee hour than the British producers. It is interesting to note the scope for going 'up-market' even in what might appear to be a product as basic as a biscuit. Since the study was conducted in the early 1990s the extent to which the luxury biscuit market in Britain is dominated by producers from continental Europe has become more marked.

78. The connection between higher German skill levels and higher productivity was identified as occurring in a variety of ways. The more highly-trained German shopfloor workers in kitchen manufacture, clothing and food processing were required to react swiftly and flexibly to the smaller batch sizes and consequent more frequent resetting of machines and machine tools required. In clothing, skilled machinists in Germany required much shorter 'changeover' times when a new design was introduced than in Britain.

79. In the hotel sector, the supervisory skills of the trained 'housekeeper' helped to raise the productivity of the unskilled workers under her control. Their work was better scheduled while the supervisor also assumed more responsibility for other tasks, for example stock control, purchasing and evaluation of new labour-saving machinery than did the British supervisor. Supervisory skills of the trained *Meister* were also particularly important in engineering.

80. The impact of higher skill levels on productivity could also be detected as working indirectly in favour of German producers as a result of the dominance of the machine tool industry by German producers. These advantages were difficult to evaluate precisely but it was repeatedly noted that German manufacturers referred to the advantage of having the machine tool producers 'just down the motorway' and able to dispatch a spare part or diagnose a difficulty quickly and so minimise down time. Researchers also noted that German manufacturers took it for granted that they would work with machine tool manufacturers to customize machinery to their own needs, often acting on suggestions which had originated from the *Meister* on the shop floor. Such customization also occurred in some plants in Britain but was there drawn to researchers' attention as being the exception rather than the rule.

81. Finally, the NIESR has stressed the importance of higher levels of maintenance skills in Germany and in the Netherlands compared to Britain. British plants invariably had one or more machines not working during visits while in Germany and the Netherlands this was a rarity.

Summary and Conclusions

82. The survey of growth in stocks of intermediate qualifications in the UK and in other European countries confirms that these countries continue to enjoy a substantial advantage in stocks of intermediate qualifications relative to the UK. Analysis of the IALS data shows that the UK/US intermediate deficit is reproduced in the IALS survey, indicating that the deficit mapped by reference to qualifications reflects in broad terms a 'real skills' deficit. While the UK has produced more young individuals with intermediate qualifications since the late 1980s than in any previous period, these qualifications are

overwhelmingly academic (A-level). Most proceed to higher education. Vocational qualifications (NVQ3) have grown only slightly. Data from the Further Education Funding Council confirm that the route to intermediate vocational qualifications (NVQ3) within full-time education barely exists.

83. Evidence from other countries shows that both the full-time and work-based part-time routes 16-19 can provide for around 80 per cent of the cohort and produce a mix of academic and vocational qualifications with around half of all those participating on each route. A number of factors, the nature of NVQ assessment, the very great susceptibility to 'academic drift' which affects British educational institutions and the existence of a small but well-respected apprenticeship programme in Britain indicate that the work-base route should, in future constitute the main path for production of intermediate vocational skills.

84. NIESR studies of production and productivity in a high skill environment show that this environment allows the production of a greater variety and higher quality of goods and services at competitive prices than is the case in the UK. An analysis of stocks of skills in five sectors of the economy shows that many jobs which are performed by graduates in the UK appear to be filled by employees with intermediate Level 3 skills in other countries, particularly Germany and the Netherlands. A switching of government resources from higher education to support routes which produce Level 3 vocational skills would therefore benefit individuals (higher wages, less social exclusion) and companies in the form of greater workforce flexibility and adaptability.

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